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Henry A. Miers.

SIR HENRY A. MIERS (1858-1942)

THE MINERALOGICAL MAGAZINE

AND

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. 185 June, 1944 Vol. XXVII

Biographical notice of Sir Henry A. Miers (1858–1942).

With portrait (Plate III) and bibliography.

By L. J. Spencer, C.B.E., M.A., Sc.D., F.R.S.

WITH the death of Sir Henry Miers on December 10, 1942, at the ripe age of 84 years the Mineralogical Society has lost its senior member and its best end. He was one of the few members of the select Crystallological Society, ich was amalgamated with the Mineralogical Society in 1883. He had served the Council of this Society almost continuously since 1888; as Vice-President in 01–4, as President 1904–9 (longer than the usual period), Editor of the Journal 91–1900, and Trustee for nearly thirty years 1911–40. Since retiring as editor 1900 he had given generous and valuable help in reading all the proof sheets of Journal until 1935, when owing to failing eyesight he was compelled to nquish this activity. Finally, he bequeathed to the Society the sum of £200 e from duty and without any conditions. He was the last surviving member the Crystallological Society, and was by eleven years the senior member of our iety.

Henry Alexander Miers was born on May 25, 1858, at Rio de Janeiro, where father, Francis Charles Miers, was a civil engineer. His grandfather, John ers, F.R.S. (1789–1879), also an engineer and distinguished as a botanist, had velled widely in South America. His great-grandfather, Francis Place (1771–4), was a radical reformer and one of the founders of University College, ndon. One of his two elder brothers, Edward John Miers, was a zoologist on the ff of the British Museum. Henry A. Miers was brought to England at the age of , his father, then retired, settling in Eden Cottage, Beckenham, Kent. There father died in 1907 at the age of 88, his mother in 1922 in her 97th year, and eldest unmarried sister in 1942 in her 89th year—all of them even longer lived n H. A. Miers himself.

From a preparatory school in Oxford he gained in 1872 a classical King's olarship at Eton. Here he was also interested in mathematics and science, in 1876 he won the public schools gold medal of the Royal Geographical iety for physical geography. From Eton he passed in 1877 to Trinity College, ford, again with a classical scholarship, and took the B.A. degree in 1881 with cond class in mathematics, but he had had a very sound and well-balanced cation. His intention then was to study physics, but with a forthcoming ancy in the Mineral Department of the British Museum he turned to crystal-

lography and mineralogy, studying under N. Story-Maskelyne at Oxford, W. Lewis at Cambridge, and P. Groth at Strassburg.[1]

He entered the Museum in October 1882 as an assistant (first class) under (afterwards Sir Lazarus) Fletcher and remained until December 1895. I fortunate in having his help and guidance during his last two years there. In 1 he had a very lucky escape in a balloon accident, being picked up unconsci while the other passenger was badly injured and the aeronaut Simmons was kil British Museum assistants were afterwards forbidden to go up in balloons. subsequent career was meteoric: Wayneflete Professor of Mineralogy at Oxf 1895–1908; Principal of the University of London, 1908–15; Vice-Chancellor the University of Manchester and Professor of Crystallography, 1915– Trustee of the British Museum, 1926–39; President of the Museums Associat 1928–33; President of the Library Association, 1932; besides many other va duties and appointments. He was elected a Fellow of the Royal Society in 1 and knighted in 1912, honorary doctor of six universities (D.C.L., Oxford, 19 and honorary member of several scientific societies, including the Russian German Mineralogical Societies (he was also a life member of the French Mine logical Society), and was awarded the Wollaston Medal of the Geological Soci of London in 1934.

When he arrived at the Museum the removal from Bloomsbury to the n Natural History building at South Kensington had been completed and collection was already in good order. He was put to work on the crystallograp catalogue of the collection, which had been started by N. Story-Maskelyne a was still in progress. Miers commenced this work with an examination of sulphosalts, starting with tetrahedrite and tennantite, but neither of th minerals yielded new data for immediate publication. Soon afterwards obtained interesting new results with meneghinite and bournonite, and he t began a detailed study of the isodimorphous group of the red-silver mineral proustite, pyrargyrite, xanthoconite, and rittingerite—and a new species wh he named sanguinite. His papers on these minerals contain elaborate discussi of the numerous crystal-forms and of the twinning. Another early piece of w was the labelling of the large collection of wooden models of crystals, on the fa of which the indices were very neatly painted. Amongst the many differ minerals that were examined merohedral symmetry was detected on crystals cuprite, stephanite, proustite, pyrargyrite, ullmannite, and spangolite. Mine determined as new for the British Isles were monazite, danalite, and spango (and later at Oxford also hitchcockite). Monazite was identified in 1885 as min crystals on an unlabelled specimen in the Museum collection, and he later s ceeded in collecting exactly similar specimens during several visits to Tint in Cornwall. Another locality for monazite ('turnerite'), which had appeare the text-books for many years as 'Mont Sorel, Dauphiné', he was able to s was based on the misreading of 'Mons. Soret' on a badly written label. His paper on material in the British Museum collections was 'On some Bri pseudomorphs'.

In another direction he made a detailed study of precious stones, and comp a manuscript catalogue of all the cut stones in the collection, recording t

[1] His first paper, published in German in 1882, was on crystals of cerussite and baryte i Strassburg collections.

ghts and checking their identity by specific gravity and refractive index deter-
ıations. Lectures on precious stones were delivered at the Imperial Institute
ture, 1895), the Society of Arts (1896), and elsewhere. He was the first to
ord danburite from Mogok in Burma. Later he visited the diamond mines in
th Africa, and he wrote the article 'Diamond' in the Encyclopaedia Britan-
ı (1910 and 1929). He was the first president (1932–37) of the Gemmological
ociation. The obituary notice in 'The Times' (December 12, 1942) makes the
ıer ambiguous remark: 'While on the staff of the British Museum Miers had
en an interest in precious stones which he always retained.'

During this period in London Miers also acted, outside Museum hours, as
ructor in crystallography in the chemical department under H. E. Armstrong
he City and Guilds College at South Kensington, where his most prominent
pil was W. J. (afterwards Sir William) Pope. There crystallographic data were
ermined for various organic compounds, including right- and left-handed
stals of optically active soberol as well as of the optically inactive pseudo-
emic form. Three modifications of a student's goniometer were designed and
structed for use in the classes. A microscope-stage goniometer was also
ised.[1]

His other activities during this period were many. In 1892 he visited museums
Scandinavia, Finland, Russia, and Germany, preparing an elaborate report
h sketches of the arrangements in each collection, the manuscript of which is
served in the library of the Mineral Department of the British Museum.
m his study of Russian he drew up in 1890, in collaboration with J. W.
gory and others, a system of Russian transliteration which is still in use for
Library Catalogue of the British Museum of Natural History. Detailed
ject indexes of mineralogical and petrographical literature for each of the
rs 1883–88 were printed in this Magazine. (His interest in bibliography was
r shown by his work on Royal Society committees in connexion with the
ernational Catalogue of Scientific Literature, and he was responsible for the
edules of the subject classification in the mineralogy volumes for the years
1–14.) He assisted in the completion of N. Story-Maskelyne's long-delayed
k 'Morphology of crystals' (1895); and being a neat and skilful draughtsman
prepared many of the 440 figures in this book. The writing of his own well-
wn text-book 'Mineralogy' (1902) was also commenced, in which the descrip-
ı of the minerals and many of the 666 figures were based on material in the
ish Museum collection. A suggestion made to Sir William Ramsay in 1895
t the gas (which had been supposed to be nitrogen) from uraninite should be
mined for argon led to the discovery of terrestrial helium.[2]

During his work on the red-silver minerals he had been impressed by the irregular
iation in the interfacial angles measured on the crystals, and this led to his later
ortant work on the growth of crystals. A new form of inverted goniometer
designed and constructed with the aid of a grant from the Royal Society (this
rument is now in the British Museum), and most of the work with it was done
is rooms in Davies Street near Grosvenor Square. With falling temperature in
small hours of the night he observed the successive changes in the position and

[1] Min. Mag., 1892, vol. 10, Proc. p. iv (title only). This instrument is described and figured
. E. H. Tutton's 'Crystallography', 1922, vol. 2, pp. 1149, 1150, 1155.
[2] Nature, 1943, vol. 151, pp. 111, 199.

size of vicinal faces (low triakis-octahedra) replacing the true octahedral posi on growing crystals of alum (reading poetry in the intervals of waiting) preliminary account of this work was given to the British Association for Advancement of Science in 1894, but publication of the full details was dela until 1903 when further work had been done at Oxford.

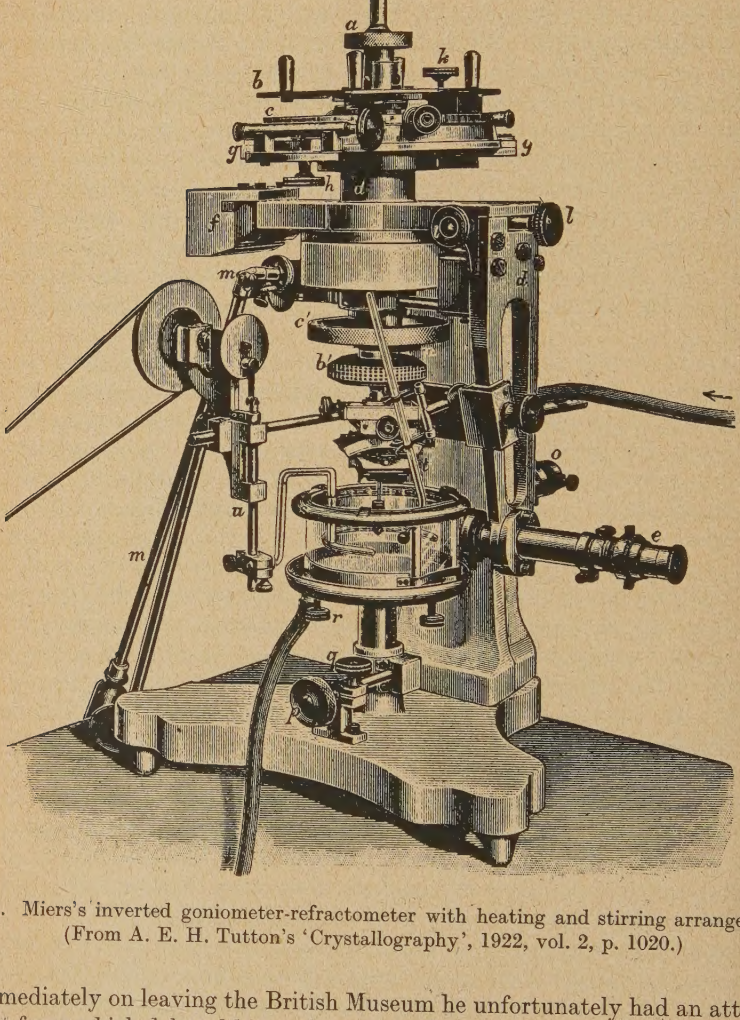

FIG. 1. Miers's inverted goniometer-refractometer with heating and stirring arrangeme (From A. E. H. Tutton's 'Crystallography', 1922, vol. 2, p. 1020.)

Immediately on leaving the British Museum he unfortunately had an attack scarlet fever which delayed his work at Oxford, and his inaugural lecture was delivered until 1896. His first work there was to organize a laboratory and the mineral collection in the University Museum into order. The collection thoroughly overhauled, registered, and labelled in detail. His earlier papers th were descriptive of material in the collection. Then he was able to turn to m intensive work on the growth of crystals. A new and more elaborate form inverted goniometer (fig. 1) was constructed. Vicinal faces were studied on

stals of various substances besides the alums. By the method of total reflection refractive index of the solution in contact with a growing crystal was deter- ned, and hence the actual concentration of the solution. The metastable and ile states of supersaturated solutions were clearly defined, and the solubility and ersolubility curves determined for a number of substances. In the metastable te crystallization is brought about only by inoculation with a germ crystal of same substance or of an isomorphous substance, while in the labile state there spontaneous shower of small crystals. In his presidential address to the Geo- ical section of the British Association in South Africa Miers suggested that the phyritic crystals in igneous rocks grew during the metastable stage, and the arm of small crystals in the groundmass during the labile stage. In addition to own papers listed under 'Growth of crystals' in the accompanying biblio- phy, 21 papers on this subject were published by his pupils at Oxford during years 1906–10, the authors being T. V. Barker, W. H. Barrett, J. Chevalier, Harold Hartley, G. A. Hutchinson, Miss Florence Isaac, B. M. Jones, and Kreutz.

During the Oxford period he was not able to devote his whole time to scientific rk. There were other calls on his versatility and organizing ability, and he ed as Secretary to the Delegates of the University Museum, Delegate of the iversity Press and of the Examination Schools, Junior Dean of Arts, Member the Hebdomadal Council, Trustee of the Oxford Appeal Fund, Bursar of nerville College, &c. He was a Fellow and Vice-President of Magdalen lege and Honorary Fellow of Trinity College.

During the second London period (1908–15) scientific work was completely in eyance. As Principal of the University of London he had to keep the balance ween the conflicting interests of the several constituent colleges on the internal e and the external examination system, and suggested improvements were held by the war.

With his appointment as Vice-Chancellor of the University of Manchester a ir of crystallography was established and he was again able to return to teach- . Several papers were produced by his pupils H. E. Buckley and G. Greenwood, ne of them dealing with the influence of impurities on the habit and growth of stals. While in Manchester he was President of the Literary and Philosophical iety; Chairman of John Rylands Library, of the northern branch of the Library the Blind, and of the University Settlement at Ancoats; also a Governor of the ammar School, in addition to connexions with the College of Technology, the rkers' Educational Association, the College of Music, &c. In 1918 he was airman of the British Universities Mission on a visit to the United States; and s a member of the Royal Commission on Oxford and Cambridge Universities 19–22), and of the Advisory Council of the Department of Scientific and Indus- l Research (1919–26); and later (1929) Chairman of the Locust Control mmittee of the Advisory Council.

On his retirement in 1926 at the age of 68 he settled in Hampstead, London, l was still overflowing with energy and enthusiasm. After administrative rk at three universities he returned with vigour to his interest in museums. borate reports were prepared for the Carnegie Trustees on the museums of British Isles, Canada, West Indies, and British Africa, based on personal ts to almost every museum. He was a very popular President of the Museums

Association with an extended period of office, a member of the Royal Commissi (1927–30) and of the Standing Commission (1931–39) on National Museums a Galleries, and a Trustee of the British Museum. He was also much interested libraries, and was President of the Library Association (1932), a Trustee of t National Central Library, chairman of the Bodleian Library Commission (19 and in 1930–31 chairman of a commission appointed by the Rockefeller Trust to visit the more important libraries in Canada, the United States, Rome, a Paris.

In 'Who's Who' there is no record of Miers's recreations (apart from his wor but travelling was evidently his hobby. When at a loose end or when baffled b problem he would just go for a ride in a railway train to nowhere in particu Several journeys were made to Canada, the United States, and South Afri and he had visited most parts of Europe. Although not in the first gold rus Klondike, he was an early visitor. At the November meeting of this Society 1901 he read a paper 'On the occurrence of gold in the Klondike: results of a v in 1901'—perhaps not a very happily worded title. Accounts of this visit w published in a report to the Canadian Minister of the Interior and in a lecture the Royal Institution in 1903.

Miers was a man of small stature with an almost boyish appearance and alwa a pleasant smile. He had a quiet and engaging manner and made many frie with no quarrels or enemies. He was modest and unassuming, and could eas adapt himself to circumstances, ready to fill in any gap—no pushing particle, b just an unobtrusive move into an unoccupied position as in a crystal lattice. had an enormous capacity for work, with many irons in the fire at the same tim His method was to have a number of writing tables in different rooms each fo separate job, and when tired or stuck at one he would turn over to another. was always much too busy to get married. By all who came in contact with hi whether as pupils or members of this Society, officially or in private life, he will remembered not only as a sound and inspiring teacher and as an able administ tor, but also for his unvarying kindness, his sympathetic appreciation of t difficulties of others, and his readiness to help. His name is commemorated mineralogists (if such were needed) in the mineral miersite, an iodide of silver a copper.

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Miers Memorial Fund

At its meeting on March 23, 1944, the Council of the Mineralogical Soci being anxious to recognize in a special manner the long services to the Soci and to the science of mineralogy of Sir Henry Miers, decided to establish a fu in his memory, when the following rules were adopted.

RULES.

1. That the Fund be called the 'Miers Memorial Fund' and that in the first instance it be used for the provision of illustrations in the Society's publications.
2. That Sir Henry Miers's legacy of £200 be transferred thereto to form the nucleus of the capital of the Fund.
3. That Members of the Society be invited to contribute to the Fund.
4. That, unless a donor shall have expressed a wish to the contrary, all donations of or exceeding £20 shall be added to the capital of the Fund, but that any donation of less than £20, if not specifically earmarked by the donor for addition to the capital of the Fund or for the income thereof, may be added to the capital of the Fund or used for the provision of illustrations at the discretion of the Council.
5. That all illustrations published with the aid of the Fund shall be suitably acknowledged in the appropriate publication.
6. That, subject to the provisions of Rule 4, the regulations governing the use and administration of the Fund shall be the same as those set out in Bye-laws nos. 22, 24, and 25, except that no stock or security belonging to the capital of the Fund shall be sold, except for purposes of change of investment, unless such sale has been authorized by the Members of the Society at an Anniversary Meeting or at a Special General Meeting of the Society.
7. That no change shall be made in the Rules, unless authorized by the Members of the Society in the manner set out in Bye-law no. 34.

The accompanying portrait (Plate III), reproduced from a photograph taken 1929 of Sir Henry Miers, is the first call on this fund for illustrations.

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An unusual occurrence of bedded thenardite.

By Edmondson Spencer, D.Sc., A.R.S.M., F.R.I.C, F.G.S.

[Read *March* 23, 1944.]

A PECULIAR occurrence of anhydrous sodium sulphate, thenardite, has recently been discovered below the salt crystallizing pans at Didwana, ihpur State, India. Here salt (NaCl) is crystallized out by evaporation in en pans from brine obtained by sinking wells alongside the pans, to a depth about 15–20 feet below the surface. The land surface consists of very fine idy silt and the salt-pans are made by cutting shallow depressions about) feet long by 85 feet wide, a low ridge of silt about 2 feet high and 3 feet broad ng left between them. The pans are cleaned out at the beginning of the salt son (February–March): the brine from the wells is run into them to a depth of o 2 inches and the salt crystallizes out by evaporation. The crystallizing salt occasionally rabbled and ridged to break up the larger crystal accumulations, l is eventually scraped to one side as a 'crop'. Brine is added regularly to keep the brine depth. The process is continued until the monsoon (rains) interferes. A peculiar feature of the process is that the well-brine fed to the pans contains igh proportion of sodium sulphate—much higher than in the salt (NaCl) oduced by crystallization. This is illustrated by the two following average alyses.

Average analysis Well-brine.		Average analysis Salt crop.	
lium chloride	18·5%	Sodium chloride	87·2%
lium sulphate	6·6	Sodium sulphate	11·2
lium carbonate	0·4	Sodium carbonate	0·2
lium bicarbonate	0·4	Sodium bicarbonate	0·1
		Insoluble matter	0·64
Total	25·9	Moisture &c. (by difference) ...	0·66
		Total	100·00

The ratio of chloride to sulphate in the brine is 3 to 1 whilst in the salt it is 8 to 1. is thus evident that sulphate of soda has disappeared from the above system some manner. This disappearance is accounted for by the recent discovery of ls of thenardite immediately below the salt-pans and partly contaminated with

.

The critical temperature for the formation of thenardite in pure solutions of the phate is 32·2° C. Above this temperature the anhydrous thenardite crystallizes, ow it the decahydrate, Glauber's salt, is produced. Sodium chloride depresses s critical temperature progressively until, in a solution saturated with the oride, the critical temperature for thenardite is reduced to 18° C. At Didwana pan-brine is practically always saturated in respect to the chloride, so that the ical temperature for the sulphate separation must lie in the lower region near C.

It is only during the first few weeks of the salt crystallization season at Didwan that the night temperatures could possibly fall below 18° C. and only in this ca could Glauber's salt crystallize out (to be ultimately converted to thenardite a the temperature rises). For the greater part of the crystallizing period thenardi alone would separate and this form of the sulphate must have crystallize simultaneously with the chloride during evaporation.

The separation, or partial separation, of this anhydrous sulphate from th chloride, and its recrystallization at the bottom of the salt-pans, appear to ha proceeded as follows. The salt (NaCl) tends to crystallize as spongy 'box- which float on the surface until they become too heavy and sink. The thenardit on the other hand, forms relatively dense and compact individual orthorhom crystals of pyramidal habit (density 2·7, against a density of 2·2 for NaCl). Th heavier and more compact crystals sink to the bottom and their separation fr the lighter spongy salt crystals is assisted by the rabbling action of breaking a ridging the latter, on the lines of the 'jigging' action in ore dressing. Th mechanical separation is assisted by the density of the brine (1·25) which accen tuates the relative difference in density of the two compounds. The greate tendency of the sulphate to form supersaturated solutions may also have con tributed to the separation and to the recrystallization of the sulphate beds in much coarser form below the pans.

These beds of thenardite vary in thickness from one to three or four feet. Th process appears to have been in operation for the past 150 years or more, and th total estimated accumulation over the whole of the salt-pan area is of the order 250,000 tons. Supplies from this deposit have already replaced all the previousl imported sulphate (salt-cake) and bid fair to continue to do so after the war.

In view of the fact that these thenardite beds have been formed in the presenc of solutions saturated in respect to sodium chloride, their relative freedom from th latter is remarkable. This is shown by the following average analysis of som 300–400 tons of sulphate taken from these deposits.

Sodium sulphate, Na_2SO_4 ...	91·9%	Magnesium sulphate, $MgSO_4$ ...	0·30
Sodium chloride, NaCl	0·80	Iron and aluminium (as sulphates)	0·56
Sodium carbonate, Na_2CO_3 ...	0·10	Insolubles...	5·7
Sodium bicarbonate, $NaHCO_3$ ...	0·40	Moisture	0·2
Calcium sulphate, $CaSO_4$... ...	0·24	Total	100·20

As mined or quarried the thenardite is in the form of interlocking masses crystals varying from ¼ inch up to an inch or more in size. Occasionally mass or slabs with pure water-clear crystals up to two or three inches in size can b separated. Several such specimens were selected for examination and for phot graphs (fig. 1). The crystals are orthorhombic and of the usual pyramidal habi the face (111) being most prominently developed, with occasional prism faces (11 and less commonly the base (001). Twinning is common, the twin- and compos tion-plane being the front orthodome (101) giving rise to 'butterfly' twin form A distinct basal cleavage is observable. On heating to 197° C. the clear crysta suddenly become opaque and pearly; below this temperature there is little or n permanent change in the optic axial angle.

Optically the mineral is biaxial and positive with a measured optic axial ang of 83·1°. The axial plane is parallel to the base and the acute bisectrix (γ) is parall

the crystallographic axis b. The three refractive indices measured on an Abbe fractometer for sodium-light are α ($\| a$) 1·4667, β ($\| c$) 1·4729, γ ($\| b$) 1·4812.

Fig. 1. Crystals of thenardite from Didwana, Jodhpur State, India. $\times \frac{1}{2}$.

is optical orientation differs from that given in the text-books, with the vibra-n-direction γ parallel to the crystallographic axis a, as quoted from C. Baer-ld (Zeits. Kryst. Min., 1881, vol. 6, p. 40).

My thanks are due to the Geological Survey of India for the photograph roduced in fig. 1.

MINERALOGICAL ABSTRACTS

(Vol. 9, No. 2, June, 1944.)

Notices of Books

ES (W. R.). *Minerals in industry.* Harmondsworth, Middlesex, & New York (Penguin Books), 1943, Pelican Books A 123, 149 pp., 32 figs. Price 9*d.*

though upward of a dozen booklets in this popular series have dealt with ous aspects of the biological sciences, this is the first to treat of a geological ect. In its fifty-six brief chapters much information is given on the uses, rrence, and production of the better-known economic minerals, while an ndix of five small sketch-maps illustrates the distribution of the world's ipal mining fields. The book is more comprehensive than many expensive ications, and it will be useful to all elementary students of geology and allied ces, as well as of interest to the general reader. C. F. D.

RNSIDES (W. G.) & BULMAN (O. M. B.). *Geology in the service of man.* Harmondsworth, Middlesex, & New York (Penguin Books), 1944, Pelican Books, A 128, 158 pp., 8 pls., 38 text-figs. Price 9*d.*

ET (Arthur) & ALEXANDER (Francis). *Metals in the service of man.* Ibid., 1944, no. A 125, 192 pp., 8 pls., 46 text-figs. Price 9*d.*

ese well-illustrated booklets, each of about 60,000 words, contain a surprising unt of reliable information by authors versed in their subject. Practical ings are emphasized. Although intended for the general reader, they supply ll text-books for students at a remarkably low price. The Geology volume ains chapters on water supply, soils, petroleum, engineering geology, omic minerals, and gemstones, and is provided with a list of books for further ing. The Metals volume deals with micro-structure, smelting, working, s, &c. Both volumes are provided with a good index. L. J. S.

EMAN (Alan M.). *Economic mineral deposits.* New York (Wiley) and London (Chapman & Hall), 1942, xi+898 pp., 1 pl., 300 text-figs. Price $6.50 = 39*s.*

this well-illustrated work the editor of 'Economic Geology' has provided a book of a most comprehensive character which will take a leading place in eld. The book is divided into three parts, of which the first (413 pp.) deals ly with the principles and processes of mineral deposition, but includes also ters on the history of the use of minerals, world and national mineral urces, geological and geophysical prospecting, elementary mining and process- f ores, and other topics. The second section (204 pp.) describes the principal sits of the metallic minerals, and the third (237 pp.) those of the non- llic minerals, including coal, petroleum, and water. It is suggested that s II and III might conveniently be used in short courses in economic geology, that the whole work be employed in longer courses, supplemented in advanced ies by collateral reading from the excellent bibliographies listed throughout. of the many minerals applied to the uses of mankind have escaped notice, e those deposits described in greater detail are drawn from all continents and

include the more important discoveries, in Russia and elsewhere, of relati recent date. Dealing with Cornish china clays, the author maintains tha burden of stronger proof than has yet been presented must fall on the miner gist who advocates a hydrothermal origin! There are some minor errors in paragraphs on the Iranian oilfields: Gach-i-Qaraghuli and Gach Saran, separ listed, are one and the same field, east (not west) of Basra. C. F.

Lovering (T. S.). *Minerals in world affairs.* New York (Prentice-Hall), ix+394 pp., 40 figs. Price $4.00.

This book, for the non-specialized reader, attempts an 'explanation of the minerals have played in the social and economic conditions that breed war effect decisions in these wars'. Sketches are given of the world distribution principal strategic minerals, with conclusions on the influence of the respe deposits on national policies. The reader's acceptance of some of these will de upon his politics. Misprints in place-names are rather frequent. C. F.

Wilmarth (M. Grace). *Lexicon of geologic names of the United States (inclu Alaska).* Bull. U.S. Geol. Surv., 1938, no. 896, 2 vols., 2396 pp. Price $2

The definitions listed in this voluminous work give information on litho thickness, age, underlying and overlying formations, type locality, and prin authorities for each formational or stratigraphical name (sedimentary, igne and metamorphic) in use throughout the United States. The names and age the geological units of Canada, Mexico, Hawaii, the West Indies, and Cen America are also included, with citations to the publications in which they defined. C. F.

Emmons (R. C.). *The universal stage (with five axes of rotation).* Mem. Geol. Amer., 1943, no. 8, 205 pp., 13 pls., 95 text-figs. Price 12*s.*

The tendency has been to regard the universal stage as mainly useful for determination of felspars and the measurement of optic axial angles of mineral thin sections of rocks, and, in later years, for petrofabric analysis. Now by me of special cells to contain immersion liquids the stage can be used as a refra meter for liquids or for determining the refractive indices of grains of kn orientation by the double dispersion method [M.A. 4–209]. These methods described, as well as the methods of determining the composition of felsp including the newest one based on the five-axis stage [M.A. 8–15]. The meas ment of birefringence is described, attention being directed to the accu determination of the thickness of the preparation from the known birefring of oriented crystals of quartz ground to the same thickness as the mineral u examination. Throughout the book the discussion is restricted to the five- stage, but workers with the older type of four-axis stage will find much tha helpful. W. C.

Economic Minerals and Ore-deposits

Mineral resources and the Atlantic charter. Advancement of Science (Brit. As Adv. Sci.), 1942, vol. 2, pp. 187–253.

The following are titles of papers presented at a conference held in Londo July 24–25, 1942. A general account of the proceedings has been given by C.

ch, Nature, London, 1942, vol. 150, pp. 171–173, 201–203, and some of the ers are reprinted in the same volume.

GORY (*Sir* Richard). Opening, pp. 189–190.
LAND (*Sir* Thomas H.). Address of chairman, pp. 190–193. (Relation of mineral resources to world peace. Nature, vol. 150, pp. 364–366.)
D (H. H.). The geological control of mineral deposits, pp. 193–195.
CETT (C. B$_t$). Key metals and the location of industry, pp. 195–197. (Nature, pp. 451–453.)
WELL (P. G. H.). Some geological reflections, pp. 197–200. (Nature, pp. 565–566.)
KE (*Sir* Wm. J.). Address of chairman, pp. 200–202.
ES (W. R.). Tin resources and the Atlantic charter, pp. 202–204, 2 figs.
MOR (*Sir* Lewis Leigh). The world's manganese-ore deposits and the Atlantic charter, pp. 204–211, 1 fig.
PBELL (Colin A.). Nickel, pp. 211–215.
ARTY (M. P.). Aluminium, pp. 215–218.
EL (Julius L. F.). Tungsten, pp. 218–220.
CH (C. H.). Address of chairman, pp. 220–223. (New metals and new methods. Nature, pp. 419–421.)
STRONG (F. E.). Minerals, old and new, from the sea, pp. 223–225. (Nature, pp. 453–455.)
GMANN (Ernst). The Dead Sea and its surroundings, pp. 225–228.
FIELD (W. H.). Economy in the use of ferro-alloys, pp. 228–231. (Nature, pp. 509–512.)
TLEY (*Sir* Harold). The recovery of metals from scrap, pp. 231–236, 3 figs. (Nature, pp. 594–597.)
LIAMS (David). Mineral resources of the U.S.S.R., pp. 236–240, 3 figs. (Nature, pp. 539–541.)
PS (*Sir* Stafford). Address of chairman, pp. 240–243.
H (J. G.). International trade in raw materials, pp. 243–245.
IS (W. A.). Some aspects of mining finance, pp. 245–247.
MAN (Arthur). Economic considerations associated with aluminium, pp. 247–249.
KILL (O. W.). Planning and the mineral industries, pp. 249–251.
MP (L. Dudley). The exploitation of minerals in relation to national and world planning, pp. 251–253. (Nature, pp. 395–396.) L. J. S.

rospectors' guide for strategic minerals in Canada. Mines and Geology Branch, artment of Mines and Resources, Ottawa, Canada, 1941, 61 pp.

n extremely useful handbook designed to aid prospectors in the search for erals for which the war has created an urgent demand. Under each of ten als (Cr, Mn, Hg, Mo, Sn, W, V) or minerals (fluorite, graphite, mica) is given ief account of uses, notes on occurrence, means of identifying the ores, ketable grades and specifications, buyers, prices, and Canada's position in ion to world production. W. C. S.

WN (John S.). *Differential density of ground water as a factor in circulation, oxidation and ore deposition.* Econ. Geol., 1942, vol. 37, pp. 310–317.

he variation of density at 27° C. of waters from the Balmat zinc mine, New k, from 1·00061 at 60 feet to 1·20462 at 1900 feet, suggests that ore-bearing tions may migrate by gravitation and ores may be deposited from descending tions. M. A. P.

WARTZ (G. M.). *Progress in the study of exsolution in ore minerals.* Econ. Geol., 1942, vol. 37, pp. 345–364.

he textures of about fifty different pairs of ore-minerals in polished sections e suggested to various authors that exsolution (unmixing) has occurred during formation. A previous list of criteria for recognizing exsolution is revised amplified. M. A. P.

Garretty (M. D.) & Blanchard (Roland). *Post-mine leaching of galena an marmatite at Broken Hill.* Econ. Geol., 1942, vol. 37, pp. 365–407, 12 fg

At North Broken Hill Limited, New South Wales, lead and zinc minerals an other sulphides and gangue minerals are undergoing rapid decomposition result in cellular structures. The lead minerals are being leached most rapidly, at ab 0·75 % per year. The percentage compositions are given of six cellular boxwor derived from high-grade lead-zinc ores and possible causes for the preferen leaching of the lead ores are discussed. M. A. F.

Blanchard (Roland). *Leached derivatives of arsenopyrite and chromite.* Ec Geol., 1942, vol. 37, pp. 596–626, 9 figs.

Oxidation and leaching of Australian lead ores rich in mispickel have produ cellular boxworks and granular fretworks of limonitic jasper, and the same pr cesses acting on the chromite ores of New Caledonia have given similar produc in honeycomb boxworks and minute cellular sponge. The processes are illustra by photographs of hand-specimens and detailed chemical and mineralog analyses of 15 Australian galena-mispickel sulphide ores and 4 New Caledonia chromite ores and their derived gossans. M. A. F.

Shaub (B. M.). *An unusual asymmetrically banded fissure vein.* Amer. Min., 19 vol. 27, pp. 507–516, 6 figs.

Ingerson (Earl). *An unusual asymmetrically banded fissure vein; a discussio* Ibid., pp. 649–651.

A museum specimen of an asymmetrically banded galena-chalybite-quar fissure vein from Clausthal, Germany, is explained by Shaub as arising fro immiscible solution pairs originating from fractionation of an earlier concentrate mineral solution. From Shaub's data and from experimental evidence this vie is combated by Ingerson, who favours an orthodox interpretation on the bas of a homogeneous dilute solution, and replacement. C. F. D.

Comba (Antonio). *Los yacimientos españoles de minerales especiales para ferr aleaciones.* Notas y Comunic. Inst. Geol. Minero de España, 1942, no. pp. 85–120.

Occurrences in Spain of minerals yielding materials (Mn, W, Mo, Ni, Cr, Si, Ti, Be, Zr) for the manufacture of iron alloys. L. J. S.

Willemse (J.). *Gudmundite and other ore minerals from the lead deposits ne Argent station, Transvaal.* Trans. Geol. Soc. South Africa, 1943, vol. (for 1942), pp. 27–35, 3 pls.

Ore specimens collected from dumps contain blende, pyrrhotine, pyrite, mi pickel, gudmundite, galena, chalcopyrite, boulangerite, bournonite, and tetrah drite, associated with chalybite, quartz, and calcite. The age relations of the o minerals are discussed. E. D. M.

Blanchard (Roland) & Hall (Graham). *Rock deformation and mineralizatio at Mount Isa.* Proc. Australasian Inst. Min. Metall., 1942, no. 125, pp. 1–6 7 text-figs, 29 pls. (= figs. 8–65+2 tables).

A detailed account is given of the geology and mineralogy of the silver-lea

ıc deposit at Mount Isa in NW. Queensland, with special reference to the con-
xion between rock deformation and mineralization. The deposit carries 9·5
llion tons of sulphides (other than iron sulphides) to a depth of 1000 feet.
ıe ore bodies form lenticular replacements of thin-bedded Proterozoic shale
enulated due to overthrusting, three generations of sulphide minerals being
esent: (1) pyrite, pyrrhotine, mispickel, blende (with laths of chlorite), chalco-
rite; (2) the preceding, followed by galena and tetrahedrite; (3) all the preceding,
lowed by jamesonite, polybasite, pyrargyrite, proustite, and sternbergite.
eposition of pyrrhotine overlapped into the galena cycle, and of the 100 million
ns of this mineral present much is of relatively low temperature formation.
ınerals of the oxidation zone are briefly discussed. C. F. D.

EWITT (William Paxton). *Geology and mineralization of the San Antonio mine, Santa Eulalia district, Chihuahua, Mexico.* Bull. Geol. Soc. Amer., 1943, vol. 54, pp. 173–204, 2 pls., 7 text-figs.

This mine, 'the first highly successful tin producer in North America', has been
rked for lead, silver, tin, vanadium, and zinc, with copper and gold as by-
oducts. The ores occur principally in 'chimneys' or pipe-like pyrometasomatic
placement bodies in down-faulted Cretaceous limestones, one of which, averag-
g 1·5–2·0 % Sn, is over 300 metres high with a mean diameter of 40 metres.
ıe emplacement of fine-grained cassiterite, frequently accompanied by fluorite
d magnetite, probably followed the introduction of galena, iron sulphides, and
ende. Commercial vanadium ores, dominantly vanadinite with some descloizite
d mimetite, are of secondary concentration, presumably from primary vana-
ım-bearing silicate minerals and vanadiferous sulphides. The intrusion
sponsible for the mineralization has not been found. C. F. D.

IOMSON (Ellis). *Quantitative mineral relations at the Upper Canada mines, Dobie, Ontario.* Univ. Toronto Studies, Geol. Ser., 1943, no. 48, pp. 93–100.

Polished sections and thin sections of ore and rock specimens to a depth of
00 feet show mainly pyrite, with chalcopyrite, galena, magnetite, zinc-blende,
aite, &c., gold and silver, together with carbonates, micas, quartz, chlorite, &c.
ıe metallic minerals associated with gold are altaite, galena, chalcopyrite, zinc-
ende, in order of decreasing frequency. M. A. P.

IEDLAENDER (Carl). *Sur les gisements aurifères de la région de Musefu (Congo Belge).* Schweiz. Min. Petr. Mitt., 1942, vol. 22, pp. 248–270, 2 pls., 10 text-figs.

An account is given of the geology and rocks of this district (7° 40′ S., 22° 32′ E.)
ar Luisa. Auriferous veins are found in gneiss and quartz-norite, and there
e alluvial deposits. L. J. S.

WELL (Wayne Russell). *The paragenesis of some gold and copper ores of south-western Oregon.* Econ. Geol., 1942, vol. 37, pp. 557–595, 15 figs.

Ore specimens were collected from 34 mines in an area of altered Palaeozoic and
sozoic rocks, Tertiary volcanics, and various intrusives, within a radius of 35
les from Grants Pass, and generalized sequences of mineral deposition have
en worked out from a study of polished sections. Among less common minerals

mentioned are gold intergrown with tetradymite, tellurium, and altaite in ore from the Jewett and Crater mines, and cassiterite from the Irwin molybdenite prospect. M. A. P.

Moorhouse (W. W.). *Gold mineralization in minor igneous intrusions.* Econ. Geol., 1942, vol. 37, pp. 318–329, 2 figs.

Auriferous pyrite in albitite porphyry in Bryce township, Ontario, indicates that mineralization is genetically related to albitization. [M.A. 8–171.]
M. A. P.

Krieger (Philip) & Hagner (Arthur F.). *Gold-nickel mineralization at Alistos, Sinaloa, Mexico.* Amer. Min., 1943, vol. 28, pp. 257–271, 9 figs.

The native gold of Alistos is associated with two modifications of hypogene ore: (1) a niccolite type containing maucherite and gersdorffite; (2) a millerite type containing pentlandite, gersdorffite, pyrite, and supergene violarite. No pyrrhotine is found. The ore occurs in narrow veins within flat-bedded latite lavas, near a stock of altered peridotite, and it is believed to have been deposited by hydrothermal solutions emanating from the latter. C. F. D

Peterson (Victor E.). *A study of the geology and ore deposits of the Ashbrook silver mining district, Utah.* Econ. Geol., 1942, vol. 37, pp. 466–502, 23 figs.

The silver and gold ores of this district in the north-west corner of Boxelder Co. are irregular replacement deposits in fractured and folded Palaeozoic limestones. A study of polished sections shows that primary mineralization gave rhodochrosite alone, then quartz, pyrite, mispickel, blende, chalcopyrite, gold, and then galena, argyrodite, pyrargyrite, pearceite, tennantite. Secondary enrichment gave argentite, silver, &c., and oxidation produced various oxides and carbonates.
M. A. P.

Jayaraman (N.). *A chemical and mineralogical examination of a copper ore from Mysore.* Journ. Indian Inst. Sci., 1940, vol. 3, pp. 53–60.

Brown, hard and compact or earthy and powdery copper ore occurring in pockets in a dolerite dike at Biligere in Nanjangud taluk is seen under the microscope to be veined with green material. Analyses (CuO 15–20 %) are interpreted as mixtures of malachite, chessylite, cuprite, a copper silicate, quartz, and hydrous iron oxide. L. J. S.

Latsky (Rudolph). *The magmatic copper ores of Namaqualand.* Trans. Geol. Soc. South Africa, 1943, vol. 45 (for 1942), pp. 109–150, 6 pls., 6 text-figs.

The ore-bearing rocks are mica-diorite, norite, anorthosite, hypersthenite, hornblende-diorite, hornblendite, gabbro, and pyroxenite, of which nine new chemical analyses are given. The plagioclase is An_{36-52} and the orthopyroxene En_{25-58}, while other minerals described are biotite, clinopyroxene, hornblende, apatite, sphene, orthoclase, epidote, orthite, calcite, and quartz. The principal ore-minerals are bornite, chalcopyrite, pyrrhotine, pyrite, magnetite, and ilmenite with subordinate blende, millerite, molybdenite, linnaeite, valleriite, and melonite, and are of magmatic origin. Age relationships of these minerals are not simple. In general the ore-minerals accompany orthopyroxene. E. D. M.

DUGLAS (G. Vibert), WILLIAMS (David), ROVE (Olaf N.), *et alii*. *Copper deposits of Newfoundland*. Bull. Newfoundland Geol. Surv., 1940, no. 20, ix+176 pp., 59 pls., 22 text-figs.

The principal copper-bearing properties are described, with data on the history mining, former production, and reserves. C. F. D.

LLULY (James). *The mineralization of the Ajo copper district, Arizona*. Econ. Geol., 1942, vol. 37, pp. 247–309, 16 figs.

The New Cornelia ore-body at Ajo, about midway between Yuma and Tucson, a 'porphyry copper' deposit consisting of chalcopyrite with subordinate rnite, disseminated in a (?) Tertiary stock of quartz-monzonite. The progres-e alteration of the quartz-monzonite, from biotite-quartz-diorite to low-grade e ($CuFeS_2$ 1·00, Cu_5FeS_4 0·70, FeS_2 0·20%), is illustrated by micrographs and ven chemical analyses, and evidence is given for the magmatic origin of the ore. M. A. P.

OSS (Clyde P.). *Some concepts on the geology of quicksilver deposits in the United States*. Econ. Geol., 1942, vol. 37, pp. 439–465, 1 fig.

A review of the occurrence and origin of mercury ores with reference to several cent or forthcoming publications of the U.S. Geological Survey. [M.A. **8**–249.] M. A. P.

ROWN (John S.). *Supergene magnetite*. Econ. Geol., 1943, vol. 38, pp. 137–148, 1 fig.

The occurrence of magnetite in oolites, replacing fossils, and in laterites and ssans, and the commercial stable black magnetic pigments prepared from cold lutions, show that some deposits are due to the action of cold dilute solutions. .A. **8**–174.] M. A. P.

ROTOV (B. P.) Кротов (Б. П.). *On the occurrence in the Khalilovo iron ore deposits of magnetite formed from solutions of superficial origin at a low temperature*. Compt. Rend. (Doklady) Acad. Sci. URSS, 1940, vol. 26, pp. 801–803.

The pisolitic-oolitic iron ores of Khalilovo, Chkalov district, [Orenburg], nsisting mainly of hydrogoethite or hydrohaematite and leptochlorite, are of rassic age. Besides some detrital magnetite, they also contain magnetite as olites, as crystalline crusts on serpentinite, and as veinlets in the ore. Its gin is attributed to the reducing action of organic matter. L. J. S.

ROTOV (B. P.) Кротов (Б. П.). *Rôle and significance of epeirogenetic movements in the formation of deposits of iron and manganese ores and bauxites*. Compt. Rend. (Doklady) Acad. Sci. URSS, 1941, vol. 33, pp. 54–55.

Considers the deposition of oolitic and pisolitic ores in gulfs, basins, and lakes connexion with earth movements. L. J. S.

ROTOV (B. P.) Кротов (Б. П.). *On the relation between ferronickel and nickel ores of the Urals*. Compt. Rend. (Doklady) Acad. Sci. URSS, 1942, vol. 37, pp. 141–143.

A rustless iron has long been produced from ochreous iron ores in the Urals.

This is due to the presence of Cr and Ni in the ore. Localities yielding such or which occurs in association with serpentine, are mentioned. L. J. S.

Barsanov (G. P.) Барсанов (Г.П.). *On the mineralogy of the Iona iron-ore depo* Compt. Rend. (Doklady) Acad. Sci. URSS, 1941, vol. 31, pp. 246–250, 2 fig

Descriptions are given of skarn ore specimens from the recently discove deposit in the Murmansk district, Kola peninsula. Magnetite as compact m with apatite and as large (4 cm.) crystals contains TiO_2 0·82, MgO 6·80 % corresponding to 34 % of the magnesioferrite molecule. Forsterite, α 1·65 γ 1·683, 2V 90°. 'Titanclinogumite' [i.e. titanoclinohumite], γ 1·686, 2V 80 positive; spectroscopic analysis shows the presence of cobalt. Schorlom t Phlogopite, α 1·575, γ 1·604, 2V 2–3°, containing cobalt. Staffelite, as botryoi l crusts in the apatite-magnetite ore, ω 1·628, ϵ 1·622, CO_2 2·61, F 3·5 H_2O 1·74 %. L. J. S.

Hawley (J. E.). *Origin of some siderite, pyrite, chert deposits, Michipicote district, Ontario.* Trans. Roy. Soc. Canada, 1942, ser. 3, vol. 36, sect. pp. 79–87, 1 pl.

A discussion of the origin of the deposits in the Michipicoten iron range suggesting further field study. M. A. P.

Smith (F. G.). *Notes on the iron ores of Steeprock Lake, Ontario.* Univ. Toront Studies, Geol. Ser., 1942, no. 47, pp. 71–75, 4 figs.

A promising deposit of iron ore underlying and adjoining this lake in the Atiko kan area, Rainy River district, is composed of compact goethite (occasionall as brilliant crystals), limonite, haematite, turgite, and quartz. The iron formatio on the East Arm of Steeprock Lake is banded chalybite and chert altered i places to banded magnetite and quartz. M. A. P.

Roberts (Hugh M.) & Bartley (Melville W.). *Hydrothermal replacement in dee seated iron ore deposits of the Lake Superior region.* Econ. Geol., 194 vol. 38, pp. 1–24, 6 figs.

The recently explored haematite and goethite deposit adjoining and underlyin Steeprock Lake, Atikokan, Ontario, is compared with the deposits of the Vermilio and Marquette Iron Ranges of the Lake Superior region. In addition to leachin concentration, and compaction, it is believed that the formation of massiv haematite in depth requires the transfer of iron from deeper magmatic source with replacement of brecciated iron carbonates. M. A. P.

Willett (R. W.). *The occurrence of iron-ore in the Catlins district, south Otag* New Zealand Journ. Sci. Techn., 1942, vol. 23, pp. 227B–230B, 1 fig.

Cemented blocks of titaniferous magnetite sand, found on hill-tops of Jurass sandstone and probably derived from the Jurassic, resemble the unconsolidate Taranaki ironsands of Recent age [M.A. 8–174]. Analyses give FeO 21·94, 22·3 Fe_2O_3 51·97, 47·82, TiO_2 7·80, 8·62 %. C. F. D.

Dennen (William H.). *A nickel deposit near Dracut, Massachusetts.* Eco Geol., 1943, vol. 38, pp. 25–55, 8 figs.

A Palaeozoic stock of norite in Cambrian quartzite contains a small pyrrhotin

ntlandite-chalcopyrite deposit which has been occasionally worked for Au, Ag, , Cu, Ni. An account is given of the general geology of the region and the trography and petrology of the stock which was mineralized late in the magmatic quence. Pyrrhotine, the main ore, with 1·5 % Ni and 0·62 % Co (indicated by ectrographic analysis) consists of the α and β forms of Scholtz [M.A. 6–440], th oriented β-lamellae in an α-matrix. Pentlandite with 1 % Ni is partly re- ced by violarite. M. A. P.

OYD (Louis). *Evidence of sulphide-silicate immiscibility at Gap nickel mine, Pennsylvania.* Amer. Min., 1942, vol. 27, pp. 389–393, 2 figs.

This mine was worked for copper in 1718 and for nickel in 1852. The ore yrite, chalcopyrite, pyrrhotine, pentlandite) borders a large lens of amphibolite gneiss, and has been variously described as of magmatic or of metasomatic origin. odules of hornblende are embedded in a sulphide matrix and are veined with phides along fractures. It is suggested that as the magma cooled sulphides and cates separated, the sulphides sinking; and with further cooling the silicates ystallized while the sulphides were still fluid. L. J. S.

ALAKHOV (A. E.) Малахов (A. E.). *Genetic types of cobalt deposits in the Urals.* Compt. Rend. (Doklady) Acad. Sci. URSS, 1941, vol. 31, pp. 148–149.

(A) Exogenetic deposits due to weathering: (1) cobaltiferous asbolites; (2) cate type, garnierite and revdinskite, with Co : Ni = 1 : 20. (B) Exogenetic posits: (1) dunite, with Co : Ni = 1 : 10 in the olivine; (2) various sulphide es, in pyrite, Cu and Fe ores, listwänite. There are no cobalt arsenides. Several alities are mentioned, but none of economic importance. L. J. S.

IAGINCEV (O. E.). *Content of nickel and cobalt in the manganese ores of Chiatura (Georgia).* Compt. Rend. (Doklady) Acad. Sci. URSS, 1942, vol. 36, pp. 180–181.

Ni and Co (Ni : Co = 10 : 1) are present in both the carbonate and oxidized s in amounts only slightly greater than the average content (clarke for Ni 0·02) the earth's crust. L. J. S.

ANASIEV (G. D.), AIDINYAN (N. K.) & BORISEVICH (I. V.)] Афанасьев (Г. Д.), Айдиньян (Н.Х.) и Борисевич (И. В.) AFANASSIEV (G. D.), AIDINIAN (N. H.) and BORISSEVICH (I. V.). *On the genesis of the Mazul manganese deposit.* Compt. Rend. (Doklady) Acad. Sci. URSS, 1940, vol. 26, pp. 792–795.

The important manganese ore deposit near Achinsk in the Krasnoyarsk region, sisting of primary rhodochrosite with secondary psilomelane and pyrolusite, ms beds several metres thick in much-altered acid lavas and schistose shales. is of hydrothermal metasomatic origin. Three stages of mineralization are ognized with three generations of rhodochrosite, and various associated nerals—pyrite, Mn oxides, francolite, baryte, zeolites (harmotome, mesolite,), native copper, hisingerite, &c. L. J. S.

LOGDIN (A. G.). *Stratigraphic position of manganese ore formations in Siberia.* Compt. Rend. (Doklady) Acad. Sci. URSS, 1943, vol. 38, pp. 135–138.

Deposits of manganese ore are known near Achinsk in the Agra range, at ulina in the East Sayan Mtns., on the river Ussa in Kuznetsk Alatau, and at

Durnovsk in the Salair range. The primary ore is carbonate bedded in metamo phic limestones, which on fossil evidence are shown to be of Middle Cambrian ag The ore is the result of biochemical (bacterial) processes in shallow basins w marine vulcanism. The phosphorite deposits of Kara-tau in Kazakhstan are of same age and formed by similar processes. L. J. S.

Boardman (L. G.). *The geology of the manganese deposits on Aucampsr Postmasburg.* Trans. Geol. Soc. South Africa, 1941, vol. 43 (for 194 pp. 27–36, 1 map, 3 text-figs.

The ore replaces basal Gamagara beds and breccias resting on dolomite a also in the dolomite itself. A bore-hole intersecting ore at about 70 feet sh that it is not merely a surface feature. E. D. M.

Boardman (L. G.). *The Black Rock manganese deposit in the south-east Kalahari.* Trans. Geol. Soc. South Africa, 1942, vol. 44 (for 1941), pp. 51– 2 pls., 1 text-fig.

At Black Rock, 45 miles NW. of Kuruman, bands of crystalline and mass manganese ore up to 25 feet thick occur in banded ironstone which they ha replaced. They are roughly parallel to the bedding. E. D. M.

Service (H.). *The geology of the Nsuta manganese ore deposits.* Mem. G Coast Geol. Surv., 1943, no. 5, 32 pp., 15 pls., 5 text-figs. Price 6*s.*

The Nsuta deposits have yielded over 7½ million tons of manganese ore and a probably the world's largest producer. The workable ores are principally pyrol site and psilomelane, but spessartine is widely distributed in low-grade mangan ferous phyllites and gondites (quartz-spessartine-rocks). Analyses are given halloysite, which is found throughout the oxide ores; pink and purple varisci which encrusts mammillary ore-masses; and a green vanadiferous mica found cavities. Gibbsite may form a coating on stalactitic ores. The structure of t deposits is described in detail; they are of Birrimian (pre-Cambrian) age, sedimentary origin, enriched by the action of meteoric waters. J. A. Du contributes an appendix (pp. 29–32) on 'Microscopical features of some specime of Gold Coast manganese ores'. C. F. D.

Jonas (Anna I.). *Manganese-bearing veins in southwestern Virginia.* Eco Geol., 1942, vol. 37, pp. 408–423, 1 fig.

Commercial deposits of manganese silicates, mainly spessartine, occur in ve in the crystalline schists and gneisses of Carroll Co. and Grayson Co. [M.A. **5**–5 **6**–144.]. M. A. P.

Walt (C. F. J. van der). *Chrome ores of the western Bushveld complex.* Tra Geol. Soc. South Africa, 1942, vol. 44 (for 1941), pp. 79–112.

Some 50 chromite samples from 16 chromitite bands occurring in the critic zone of the Bushveld igneous complex were analysed, the method of analy being described. The FeO and MgO content varies and is clearly related to t composition of the orthopyroxene in the silicates overlying each band. T composition shows the chromite to be a solid solution of chrompicotite a oxychromite, and the proportion of these two constituents is also related to t composition of the overlying silicates. This indicates that chromite and orthop roxene were derived from the same magma, the chromite bands accumulati

der gravity. It appears that several bands were formed from the same magma low. E. D. M.

AAG (H. L.). *Wolfram in Nigeria: with notes on cassiterite, wolfram and columbite zones.* Bull. Inst. Min. Metall., 1943, no. 458, 34 pp., 5 figs.

This is a useful account of the distribution of wolframite throughout the gerian tin-mining region. Special reference is made to the decomposition of trital ore under tropical conditions. In mineral veins outside the margins of the 'ounger Granite' wolframite is predominant and cassiterite rare, with no lumbite; within the granite, near the contact, cassiterite predominates, with me wolframite and columbite; farther within the granite columbite predomi-tes, with much cassiterite but little wolframite C. F. D.

ARTRIDGE (John F., *Jr.*). *Tungsten resources of California.* California Journ. Mines Geol., 1941, vol. 37, pp. 225–326, 20 figs.

While primarily concerned with detailed description of tungsten mines and ning in California, this lengthy paper also gives a useful digest of the mineralogy d geology of other tungsten deposits. The 1939 Californian production was 35 tons 60 % WO_3, entirely from scheelite ore. C. F. D.

UBERT (G. K.). *Tungsten ores in South Africa with special reference to Namaqualand and the Orange River.* Bull. Geol. Surv. South Africa, 1941, no. 13, 8 pp., 1 map. Price 6*d*.

This short pamphlet deals mainly with recent small-scale developments in ngsten recovery along the lower Orange River. Reference is made to the use of ra-violet light in prospecting. E. D. M.

ERS (R. H.) & GREENWOOD (J. Neill). *The processing of a tantalite ore and the preparation of the carbides of tantalum and columbium.* Proc. Australasian Inst. Mining & Metall., 1943, n. ser., no. 129, pp. 41–53.

ERS (R. H.). *A review of the literature on the chemistry and metallurgy of tantalum and columbium.* Ibid., pp. 55–79.

The powdered ore is stirred into a fused mixture of NaOH (90 %) and Na_2CO_3; er leaching with water the insoluble sodium tantalate and niobate are decomsed by HCl, giving Ta and Nb oxides. These are dissolved in HF with KF, d K_2TaF_7 and K_2NbF_7 separated by fractional crystallization. These are nverted into the oxides and heated at 1600–1800° with powdered carbon. NbC s sp. gr. 7·33 and TaC 14·02.

The second paper includes a list of Ta and Nb minerals with mention of localis. The most productive deposits of tantalite are at three places (Bynoe rbour, Finnis river, and West Arm) near Darwin in North Australia and in the bara district, northern Western Australia. L. J. S.

ITAROV (N. I.) & IVANOV (L. A.) Хитаров (Н. И.) и Иванов (Л. А.). *On the mutual connexion of molydenum and silicic acid.* Compt. Rend. (Doklady) Acad. Sci. URSS, 1940, vol. 27, pp. 694–696.

The usual association of molybdenite and quartz suggests that these minerals

were deposited by gaseous silicomolybdic acid, $SiO_2.12MoO_3.xH_2O$. This is supported by experiments in which mixtures of Na_2MoO_4 and SiO_2 gel were heated in an autoclave. L. J. S.

Williams (W. B.). *Bauxite in Tasmania.* Bull. Imp. Inst. London, 1943, vol. 41, pp. 196–200.

Dickinson (D. R.). *The nature and origin of Tasmanian bauxite.* Ibid., pp. 200–203.

Considerable deposits of low-grade ferruginous bauxite associated with basalt and volcanic tuffs are found at Ouse, Campbell Town, Swansea, and St. Leonards. An analysis gave Al_2O_3 51·3, Fe_2O_3 15·87, SiO_2 1·76, TiO_2 1·6, ign. 27·2 %. L. J. S.

Krotov (B. P.) Кротов (Б. П.). *"Friable" bauxites and the Cretaceous crust of bauxite weathering in the Sokolov deposit of the region of Kamensk (central Urals).* Compt. Rend. (Doklady) Acad. Sci. URSS, 1942, vol. 35, pp. 76–78.

Beds of crumbly bauxite, associated with beds of stony, clayey, and pisolitic bauxites, are attributed to continental weathering at the period of their formation. L. J. S.

Kent (L. E.), Russell (H. D.), & Rooyen (D. P. van). *Fluorspar in the Union of South Africa and South West Africa.* Bull. Geol. Surv. South Africa, 1943, no. 14, 69 pp., 3 pls., 12 text-figs. Price 1*s.*

Although primarily concerned with South African deposits of fluorite, this memoir contains useful general chapters on the properties, types of occurrence, grading, and uses of this mineral. In all 28 domestic occurrences are listed, of which the more important, all in the Transvaal, are replacement deposits in dolomite in the Marico district; veins and pipe-like bodies in the 'Red' granite of the Bushveld complex; and apatite-rich deposits in the alkalic rocks of Pilansberg and Leeuwfontein. Reserves are estimated at 750,000 tons. C. F. D.

Wynne (J. Norman). *The Stanhope Burn fluorite mine.* Mining Mag., London, 1943, vol. 69, pp. 265–273, 6 figs.

Contains notes on the history of this mine in County Durham, an account of the present development (1941), and some notes on the uses of fluorite. W. C. S.

O comércio do quartzo sob o contrôle da Mobilização Econômica. Mineração e Metalurgia, Rio de Janeiro, 1943, vol. 6, no. 36, pp. 287–290.

A résumé of recent Brazilian legislation on the grading of piezoelectric quartz with official minimum export prices for each size and grade of crystal. C. F. D.

Miser (Hugh D.). *Quartz veins in the Ouachita Mountains of Arkansas and Oklahoma (their relations to structure, metamorphism, and metalliferous deposits).* Econ. Geol., 1943, vol. 38, pp. 91–118, 5 figs.

Vice-presidential address arising from the author's hobby of collecting quartz

ystals in Arkansas. These are mainly obtained from roadside dealers near ot Springs, Crystal Springs, and Paron, and are mined in the Crystal Mountains d elsewhere in a belt 25 × 75 miles extending from Paron near Lake Winona to ena near the Arkansas-Oklahoma line. The crystals are low-quartz of normal d varied habits, milky, clear, and smoky, from small size to 330 pounds. bout $12,000 worth were sold in 1941, and the annual production of clear ystals weighing half a pound or more, including material suitable for radio cillators, does not normally exceed 1000 pounds. M. A. P.

HROETER (Joachim). *Das Salz in der Vorgeschichte und in der Antike.* Ciba Zeitschrift, Basel, 1943, vol. 8, no. 90, pp. 3154–3160, 8 figs.

HROETER (J.). *Zur Entwicklung der chemischen und kristallographischen Vorstellung vom Salz.* Ibid., pp. 3161–3166, 6 figs.

URRI (C.). *Salzlagerstätten und ihre Entstehung.* Ibid., pp. 3167–3170, 6 figs.

ERVAIN (F. de). *Die Salzgewinnung.* Ibid., pp. 3171–3174, 5 figs.

ÜTTER (O.). *Schweizer Salinen.* Ibid., pp. 3175–3179, 7 figs.

GGLI (P.). *Bemerkungen zur Definition des Begriffes "Salz".* Ibid., pp. 3180–3185, 4 figs.

UTHARDT (F.). *Zur Biochemie des Kochsalzes.* Ibid., pp. 3186–3188.

A series of short articles handsomely illustrated by pictures and diagrams ich aim at giving an all-round popular account of salt (mostly halite) and ludes the following subjects: history of salt mining, progress in the study of t, formation of salt deposits, salines in Switzerland, and the biochemistry of t. S. I. T.

BEY (V. S.) & SHUKLA (S. K.). *On some alkaline (natural soda) lakes of Nara Taluka, Khairpur State, Sind, with a note on purification of 1 ton of natural soda.* Quart. Journ. Geol. Mining & Metall. Soc. India, 1942, vol. 14, pp. 125–142.

Several small lakes amongst the sand-dunes dry up during the summer and the la ('kharo') is then collected. Analyses show an average content of 62·5 % $_2CO_3$ (75·5 % in samples dried at 110° C.) with 2–3 % NaCl and 2–3 % Na_2SO_4. L. J. S.

DAME (Georges). *Le gisement potassifère de Mamane en Iran.* Schweiz. Min. Petr. Mitt., 1942, vol. 22, pp. 242–246.

The Mamane salt mine in NW. Persia near the border of Azerbaijan has been rked from time immemorial. Thin beds of salt with overlying gypsum occur in al limestone of Miocene age. Potash is present in small amount, but not ficient for economical working. It is richer in the upper coloured beds which tain reddish-grey nodules (2–8 cm.) of polyhalite, analysis of which gave SO_4 90, Cl 0·10, Ca 13·50, Mg 3·98, Na 0·05, K 11·96, Fe_2O_3 0·20, H_2O 6·34, insol. 2 = 99·15. This is no doubt the material to which the name mamanite was plied (A. Goebel, 1865); carnallite said to be associated with this was not found. L. J. S.

[Tatarinov (P. M.)] Татаринов (П. М.) (editor). Индерские бораты: сборник статей. [*The Inder borates: a symposium.*] Leningrad & Moscow (Centr. Geol. Prosp. Inst.), 1938, 243 pp., text-figs., pls., & coloured map. Price 8*r.* (bound 9*r.* 75*k.*).

The important borate deposits around Lake Inder in western Kazakhstan lie between latitudes 48° 25′ and 48° 40′ N., longitudes 51° 45′ and 52° 10′ W., the minerals present including principally hydroboracite, ulexite, inyoite, colemanite, pandermite, β-ascharite [= camsellite (M.A. **7**–463)] and inderite [M.A. **6**–336; **7**–122, 123]. In this symposium of sixteen papers by various authors the orography, climate, geology, and tectonics of the district are discussed, and the various economic occurrences are described in detail. Accounts of the minerals by M. N. Godlevsky do not materially supplement data previously published by him. [M.A. **7**–122.] C. F. D.

Houk (Lawrence G.). *Monazite sand.* Information Circular, U.S. Bureau of Mines, 1943, no. I.C. 7233, 19 pp. (mimeographed).

A description of commercial deposits throughout the world, with a collection of analyses and production statistics for the years 1893–1938. C. F. D.

Oakley (Kenneth P.). *British phosphates. Part IV. Occurrences of phosphate in pre-Cretaceous rocks.* Wartime Pamphlet, Geol. Surv. Great Britain, 1942, no. 8, 27 pp., 1 fig. (map). Price 1*s.* 6*d.* [M.A. **8**–169.]

Robertson (T.), Knox (J.), & Anderson (J. G. C.), with analyses by Muir (A.) & Hardie (H. G. M.). *Limestones of Scotland. Area VII, Northern and north-western Scotland.* Wartime Pamphlet, Geol. Surv. Great Britain, 1942, no. 13, 36 pp., 6 figs (maps). Price 1*s.* 9*d.* [M.A. **8**–169].

Gupta (Khirodekumar Sen). *The asbestos deposits of Rajnagar, Seraikella State.* Quart. Journ. Geol. Mining & Metall. Soc. India, 1942, vol. 14, pp. 91–98, 2 pls.

The white asbestos worked at this locality (22½° N., 86° E.) has been previously regarded to be an amphibole-asbestos, but it seems to be a chrysotile-asbestos. It occurs as veins in serpentine associated with altered peridotite. The fibres, up to 5 inches long, show a gradation from the cross-fibre to the slip-fibre type. At 800° C. there is a loss of 0·4 % water, and the colour becomes golden, without any loss of flexibility. L. J. S.

[Tatarinov (P. M.)] Татаринов (П. М.) (editor). Слюды СССР. [*Micas of the USSR.*]. Leningrad & Moscow (Centr. Geol. Prosp. Inst.), 1937, 543 pp., numerous figs. Price 20*r.* (21*r.* 50*k.* bound).

The principal districts in European Russia where muscovite is quarried or mined include northern Karelia, along the Kandalaksha gulf; the Ion region of western Kola; the Keiv range of central Kola; the Volhynia and Mariupol districts of the Ukraine; and many localities in the Urals around Sverdlovsk (also worked for vermiculite). Asiatic deposits include principally those of the Biryusa region (54° 20′–54° 35′ N., 97° 35′–97° 55′ W.); the Mama pegmatite field

7°–59° N., 112°–113° 30′ W.); Kondakovo, 200 km. NNE. of Krasnoyarsk (all ese in Eastern Siberia); and various localities in eastern, western, and north-estern Transbaikalia. There are many minor and undeveloped deposits. hlogopites are worked in the East Siberian region and in the Yakutian ASSR. he above and other deposits are described in detail in this symposium of 20 apers, but to only one of these—a sixty-page review on the chemical constitution nd crystal structure of the micas, by A. K. Boldyrev—is an English summary ppended. The pegmatites of Kondakovo, described by A. A. Yakzhin, carry uscovite (4 analyses listed), turbid green beryl (I), honey-coloured beryl (II), d garnet (III), brown garnet (IV), dark green apatite (V), sillimanite, lazulite, anite, tourmaline, graphite, graftonite, vivianite, and many commoner pegma-te minerals. (Analyses I, II, V by E. F. Denisov and E. V. Smirnov.)

	SiO_2.	TiO_2.	Al_2O_3.	Fe_2O_3.	FeO.	MnO.	MgO.	CaO.	Na_2O.	K_2O.
I.	66·92	—	17·69	2·08	2·30	0·01	0·31	0·21	1·28	0·11
II.	66·00	—	19·01	1·80	1·46	0·02	—	0·31	0·80	0·31
III.	43·05	1·00	13·33	—	28·05	5·58	3·65	2·54	1·62	—
IV.	44·12	—	12·89	—	24·14	14·25	1·96	0·68	0·34	0·53
V.	0·25	0·02	3·13	0·32	0·50	8·84	nil	46·23		0·56

	Li_2O.	H_2O+.	H_2O-.	P_2O_5.	F.	Cl.	B.	BeO.	Rb_2O.	Total.
I.	0·03	—	0·07	—	—	—	0·12	9·24	0·05	100·42
II.	0·03	—	—	—	—	—	0·16	10·12	0·10	100·12
III.	—	0·90	0·34	—	—	—	0·13	—	—	100·19
IV.	—	0·84	0·22	—	—	—	0·11	—	—	100·08
V.	nil	0·21	0·20	39·20	1·20	0·15	0·35*	—	—	101·16

* = B_2O_3. I and II with Cs_2O = trace.

C. F. D.

AKLEY (Kenneth P.). *Glauconite sand of Bracklesham beds, London basin.* Wartime Pamphlet Geol. Surv. Gt. Britain, 1943, no. 33, 27 pp., 5 figs. Price 1*s.* 6*d.* Mimeographed.

The Bracklesham beds of the London basin, of Eocene age, contain a wide-read development of glauconitic (< 50 % rich in glauconite) and glauconite > 50 % rich) sands and loams, accessible reserves of glauconite sand along enty miles of outcrop being estimated at 7,000,000 tons, containing about 0,000 tons of potash. The stratigraphy and distribution of the deposits are scribed in detail, and the uses of glauconite in agriculture, in the paint industry, water-softening, as a source of potash, &c., are discussed. A magnetic separa-on of fresh glauconite from Oystershell Hill, Chobham Common, Surrey, ntaining as impurity a little illite and quartz, gives on analysis (analyst C. O. arvey; * = spectrographic determinations by J. A. C. McClelland): SiO_2 50·40, $_2O_3$ 6·46, Fe_2O_3 20·17, FeO 1·43, MgO 4·34, CaO 0·03*, Na_2O 0·11, K_2O 7·57, $_2O+$ 5·02, H_2O- 4·06, TiO_2 0·09, P_2O_5 0·04, MnO 0·02, CO_2 0·0, F (< 0·02), S 0·03, $_2O_3$ 0·03, BaO 0·0*, Li_2O trace, Rb_2O 0·02*, Cs_2O 0·0* = 99·82. C. F. D.

Miscellaneous

ERASIMOVSKY (V. I.)] Герасимовский (В. И.). О виллиомите [villiaumite] из Ловозерских тундр. Доклады Акад. Наук СССР, 1941, vol. 32, pp. 492–495. [M.A. 8–303].

Kolbeck (F.) [1860–1943]. *Barytocalcit von der Grube Himmelsfürst bei Freiberg (Sachsen).* Min. Petr. Mitt. (Tschermak), 1942, vol. 54, p. 373.

Analysis by Winterstein of optically monóclinic barytocalcite gave CO_2 29·66, BaO 50·23, CaO 18·90, MgO 0·61, insol. 0·26, H_2O- 0·20 %. Baryte and witherite have been previously recorded from this locality. L. J. S.

Neiva (J. M. Cotelo). *Notas sôbre a calcopirite da mina da Kakanga.* Bol. Soc. Geol. Portugal, 1943, vol. 2, pp. 49–53, 1 pl.

Groups of chalcopyrite crystals (up to 7 cm.) of pseudo-octahedral habit with the forms (111), (1$\bar{1}$1), and twinned on (111), rarely (110), occur with chalybite and calcite in the Kakanga mine, Moatize, Tete, Mozambique. Analysis gave S 35·72, Cu 34·02, Fe 30·46 = 99·75, sp.gr. 4·207. L. J. S.

Aminoff (G.). *En rheniumrik molybdenglans.* Geol. För. Förh. Stockholm, 1943, vol. 65, pp. 71–72, 1 fig.

A molybdenite from Lainejaur, Sweden, contains 0·25±0·05 % rhenium. C. F. D.

Palache (Charles). *Calcite: an angle table and critical list.* Contributions from the Department of Mineralogy and Petrography, Harvard University, 1943, no. 259, 27 pp. 4º. (mimeographed).

An elaborate compilation of 696 crystal-forms of calcite, giving Bravais and Miller indices, calculated ρ and ϕ angles, first observer, and frequency. Angle table I includes 328 certain forms, II lists 302 probable and uncertain forms, and table III 66 discarded forms. References are given to the more recent literature in which many errors in calculated angles are noted. L. J. S.

Mason (Brian). *Mineralogical aspects of the system FeO–Fe_2O_3–MnO–Mn_2O_3.* Geol. För. Förh. Stockholm, 1943, vol. 65, pp. 97–180, 11 figs.; Acad. Diss. Stockholm, 1943.

A critical review is given of the literature, together with some new observations and data. The systems separately considered are: FeO (wüstite, i.e. FeO with a slight excess of oxygen)–Fe_2O_3 (α-Fe_2O_3 haematite, and γ-Fe_2O_3 maghemite); MnO–Mn_2O_3 (manganosite, hausmannite, α-Mn_2O_3, γ-Mn_2O_3); FeO–MnO; Fe_3O_4–Mn_3O_4 (magnetite, jacobsite, vredenburgite, hausmannite); and Fe_2O_3–Mn_2O_3 (α-Fe_2O_3, bixbyite, α-Mn_2O_3). New X-ray data are given for braunite, $3Mn_2O_3.MnSiO_3$. The terms iozite [M.A. 2–383], devadite, garividite [M.A. 7–169], and sitaparite are rejected. A bibliography of 129 items is appended. L. J. S.

Fries (Carl, *Jr.*), Schaller (Waldemar T.), & Glass (Jewell J.). *Bixbyite and pseudobrookite from the tin-bearing rhyolite of the Black Range, New Mexico.* Amer. Min., 1942, vol. 27, pp. 305–322, 7 figs.

Glossy black cubes (0·5–6 mm. edge) of bixbyite have been found in crevices, lithophysae, and cavities in rhyolite at five places in the Black Range, associated with topaz, cassiterite, haematite, quartz, opal, &c. Less common forms are *d o n* and new *u* (554) and *t* (421), Sp. gr. 5·05, H. 6–6½, Analysis, Mn_2O_3 51·92

$_2O_3$ 42·54, Ti_2O_3 1·57, Al_2O_3 0·47, MgO trace, insol. 2·21 = 98·71, agrees with $n,Fe)_2O_3$. Pseudobrookite as shining black prisms (1 mm. long) shows several rstal-forms including five new in the striated prism zone. A review is given previously known occurrences of bixbyite and pseudobrookite, minerals of naerolic or pneumatolytic origin. L. J. S.

ONDEL (Clifford). *New data on agricolite, bismoclite, koechlinite, and the bismuth arsenates.* Amer. Min., 1943, vol. 28, pp. 536–540.

Agricolite (sp. gr. 6·63) is identical with eulytite (sp. gr. 6·61), the X-ray tterns being the same and *n* about 2·04. Bismoclite is recorded from Tintic, ah, and Bygoo, New South Wales; and koechlinite from Coolgardie, Western stralia, and Bygoo, N.S.W. Rhagite is identical with atelestite. Arsenobismite m Tintic, Utah, is a valid species, and is also recorded from Tazna, Bolivia. new bismuth arsenate as a white powder from Tintic and Tazna is briefly scribed but unnamed. X-ray powder spacings are given for koechlinite, lestite, arsenobismite, and the new arsenate. L. J. S.

ONDEL (Clifford). *Mineralogy of the calcium phosphates in insular phosphate rock.* Amer. Min., 1943, vol. 28, pp. 215–232.

The bulk of this material, formed by the leaching of guano into coral limestone, nsists of carbonate-hydroxyl-fluorine-apatite. The only other distinctive cies are brushite, monetite, and whitlockite, and these are rare. A large mber of ill-defined minerals have in the past been described. All available e material has been examined by X-ray and optical methods. Collophane is nutely crystallized apatite. Ornithite is a pseudomorph of apatite after ushite. Nauruite, pyroguanite, and sombrerite are identical with apatite. tabrushite, stoffertite, and epiglaubite are identical with brushite. Glaubapatite mixture of monetite and apatite. Zeugite, pyrophosphorite, and martinite are ntical with whitlockite; optical data and chemical composition of these are ulated, and additional X-ray powder data are given for whitlockite (high-nperature β-$Ca_3(PO_4)_2$) from North Groton, New Hampshire [M.A. 8–99; for 9·9 read 36·9]. L. J. S.

TCHELL (Lane), FAUST (G. T.), HENDRICKS (S. B.), & REYNOLDS (D. S.). *The mineralogy and genesis of hydroxylapatite.* Amer. Min., 1943, vol. 28, pp. 356–371, 5 figs.

Yellow hydroxylapatite (anal. I) in talc-schist and green fluor-hydroxylapatite) in chlorite-schist from a serpentine quarry near Holly Springs, Cherokee Co., orgia, both gave X-ray powder patterns practically identical with that of rapatite, but the refractive indices and birefringence increase with the amount OH. The Swiss hydroxylapatite [M.A. 7–106] on re-examination showed F 1·01% l sp. gr. 3·21, and is thus really a fluor-hydroxylapatite. The mineral appears e of metamorphic origin in rocks where water is available.

P_2O_5.	CaO.	MnO.	MgO.	H_2O.	F.	Cl.	insol.	Total.	Sp. gr.	ω.	ϵ.
42·05	55·84	0·07	0·10	1·86	0·16	trace	0·15	100·23	3·21	1·651	1·644
41·96	55·90	0·10	0·05	1·33	0·84	0·06	0·15	100·39	—	1·645	1·640

L. J. S.

Azcona (J. M. L. de) & Abbad (M.). *Manganoapatito de Hornachuelos, Córdob (España).* Notas y Comunic. Inst. Geol. Minero de España, 1942, no. 10, pp 159–160, 1 fig.

Bluish-green prisms from this locality contain about 5 % Mn (determine spectroscopically). L. J. S.

Hutton (C. O.) & Seelye (F. T.). *Francolite, a carbonate-apatite from Milbur Otago.* Trans. Roy. Soc. New Zealand, 1942, vol. 72, pp. 191–198, 2 figs.

Francolite as minute stumpy hexagonal or pseudohexagonal prisms forms th cement of a quartzose sandy phosphorite, physical properties of the pure mine being α 1·620–1·622, β 1·624–1·627, γ 1·625–1·627, negative, 2V 0–25°, sp. gr 3·15–3·18. Chemical analysis of the francolite, by F. T. Seelye, gives SiO_2 2·72 TiO_2 0·06, Al_2O_3 1·18, Fe_2O_3 2·11, FeO 0·27, MnO trace, MgO 0·41, CaO 51·30 Na_2O 0·46, K_2O 0·17, F 3·66, Cl nil, CO_2 3·20, P_2O_5 34·63, SO_3 nil, H_2O+ 1·18 H_2O- 1·02 = (−O for F) 100·38. From this analysis is deduced the formula $(Ca,C,Na,K)_{10}(P,C,Si,Al)_6$ $(OH,F)_{3·3}O_{22·7}$. A curve plotting loss on ignition against ignition temperature (105–1300° C.) is included. C. F. D.

Jayaraman (N.). *A chemical and mineralogical study of the celestine from the phosphatic nodules of the Cretaceous rocks of Trichy.* Quart. Journ. Indian Inst. Sci., 1940, vol. 3, pp. 11–20, 1 pl., 2 text-figs.

Colourless to white celestine fills septarian cracks in the phosphatic nodules. Poorly developed crystals (*m b c o d*) tabular on (001) and elongated along the *a*-axis gave $a : b : c = 0·7803 : 1 : 1·2799$, α 1·6219, β 1·6239, γ 1·6311(Na), sp. gr 3·9853. Poor crystals tabular on (001) and equally developed along the *a* and *c* axes gave sp. gr. 3·9785. Well-developed crystals (*o m*) of prismatic habit parallel to the *a-axis* gave $a : b : c = 0·7808 : 1 : 1·2819$, α 1·6223, β 1·6238, γ 1·6313, sp. gr 3·9841. Analysis gave SO_3 43·04, SrO 54·67, BaO 0·78, CaO 0·46, SiO_2 0·32 Fe_2O_3 0·15, P_2O_5 trace, 'loss' 0·12 = 99·54. L. J. S.

Jayaraman (N.). *Origin of celestine in the Cretaceous beds of Trichy.* Quart. Journ. Indian Inst. Sci., 1940, vol. 3, pp. 25–27, 2 pls.

Lumps (50–60 lb.) of celestine associated with gypsum are abundant in the clay beds and are found as small heaps over an area of 16–20 sq. miles. The columnar crystals (up to 7 cm. long) contain 95% $SrSO_4$. Fibrous celestine encrusts casts of ammonites, the fibres being perpendicular to the surface and with a colour banding parallel to the surface. The mineral may be partly or completely altered to fibrous or earthy strontianite. Strontium is present in the clay, probably from radiolaria, and it is suggested that the celestine was formed by the action of $Sr(HCO_3)_2$ on gypsum. L. J. S.

Hödl (Alfred). *Über Chlorite der Ostalpen.* (Berichtigungen.) Neues Jahrb. Min. Abt. A, 1943, vol. 77, pp. 499–500.

Corrections to a previous paper [M.A. 8–304]. L. J. S.

IDOHR (Paul). *Vermutliche Identität von Hatchit mit Gratonit.* Neues Jahrb. Min. Monatshefte, Abt. A, 1943, pp. 89–91, 1 fig.

general similarity in the aspect of the crystal drawings of hatchite [Min. Mag. 287] and gratonite [M.A. 7–512, 8–304] suggested a comparison of the crystal-ns and angles. A certain amount of agreement was found, but some of the les differ by 1–3°. L. J. S.

CHATSCHKI (F). *Zur Mitteilung von H. Strunz: Kristallographie und chemische Formel von Långbanit.* Neues Jahrb. Min. Monatshefte, Abt. A, 1943, pp. 46–47.

riticism of Strunz [M.A. 8–382], with reference to Kraus and Mussgnug A. 8–291].

ROV (A. I.) & KALININ (S. K.) Егоров (А. И.) и Калинин (С. К.). *Distribution of germanium in the coals of Kazakhstan.* Compt. Rend. (Doklady) Acad. Sci. URSS, 1940, vol. 26, pp. 925–926.

ermanium was found spectroscopically in eleven coals of 500 samples from 35 osits. These are brown coals of Cretaceous and Jurassic age, the largest amount 0·1–0·5 % in the ash) in a lignite containing the least amount of ash (1·56 %). ie was found in Carboniferous coals. L. J. S.

ROVIK (S. A.)] Боровик (С. А.) BOROVICK (S. A.). *On the content of germanium and other rare elements in topazes and beryls of the USSR.* Compt. Rend. (Doklady) Acad. Sci. URSS, 1941, vol. 31, pp. 24–25.

pectroscopic analysis of topaz from several localities showed Ge 0·001– % ; some contain Ga up to 0·005 % ; and single specimens showed Zn, V, Ni, Beryls from the same localities contain no Ge ; a green beryl rich in Cr gave ·01 %. Chrysoberyl gave Sn 0·1 % and Ga. L. J. S.

KOPENKO (N. M.) Прокопенко (Н. М.). *Prospecting evidence for indium.* Compt. Rend. (Doklady) Acad. Sci. URSS, 1941, vol. 31, pp. 16–18.

– *Occurrence of indium in various metallogenic cycles of the USSR.* Ibid., pp. 19–21.

ROVIK (S. A.) & PROKOPENKO (N. M.)] Боровик (С. А.) и Прокопенко (Н. М.) BOROVICK (S. A.) and PROKOPENKO (N. M.). *Distribution of indium in Ural ore-deposits.* Ibid., pp. 22–23.

n attempt is made to trace metallogenic provinces and epochs for the irregular rrences of indium. In the Urals it is present in some (but not all) blendes, icularly in the rarer dark-coloured ferruginous variety ; also in wolframite, copyrite, &c. [M.A. 7–310 ; 8–178, 301.] L. J. S.

YUGA (D. P.) Малюга (Д. П.). *On cadmium in organisms.* Compt. Rend. (Doklady) Acad. Sci. URSS, 1941, vol. 31, pp. 145–147.

dmium appears to be very widespread in the lithosphere, having been cted in amounts up to 0·0045 % in soils and in many animals and plants. always less abundant than zinc, but the ratio varies considerably.

M. H. H.

Miropolsky (L. M.) Миропольский (Л. М.). *Distribution of nickel and copper in t caustobiolites of Tataria.* Compt. Rend. (Doklady) Acad. Sci. URSS, 194 vol. 35, pp. 155–156.

The ash of brown coal contains Ni 0·011–0·018, Cu 0·004–0·015 %. That peat and bituminous rocks contains rather less. L. J. S.

[Beard (E. H.)]. *Recent discoveries of gorceixite in the Empire.* Bull. Imp. I London, 1941, vol. 39, pp. 160–164.

Gorceixite as greyish-white porcellaneous 'favas' from diamondiferous gra in the Oiyi district, Sierra Leone, is microcrystalline and optically uniaxial, sp. g 3·07, *n* 1·62, and gave the following analysis by W. H. Bennett. The figures brackets are for dark brown jaspery 'favas' with sp. gr. 2·95, *n* 1·63. P_2O_5 22·7 (23·29), Al_2O_3 30·95 (29·01), Fe_2O_3 1·02 (2·89), BaO 18·07 (18·41), CaO 2·17 (2·2 ThO_2 and rare-earths 2·00 (0·52), MgO 0·08 (0·07), SiO_2 5·77 (6·24), TiO_2 0· (0·25), SO_3 1·00 (0·75), F 0·20 (0·30), ign. 16·17 (16·23), total 100·48 (100·5 These analyses approximate to Hussak's formula $BaO.2Al_2O_3.P_2O_5.5H_2$ Mention is also made of the occurrence of gorceixite in diamondiferous grave from Bonsa river near Dompin in Gold Coast and from Issineru in the Mazaru district of British Guiana. [M.A. 8–274.] L. J. S.

Chang (Keng). *Native antimony from Lamo, Nantan, Kuangsi.* Bull. Geol. S China, 1941, vol. 21, pp. 59–66, 1 fig.

Lamellar to botryoidal native antimony (sp. gr. 6·6) occurs with stibnite an wolframite in quartz veins in Devonian slates penetrated by granite. Alteratio products are antimony-ochre and valentinite. L. J. S.

Chang (Keng). *Alteration of chalcocite in Tamoshan, Siugen, Kuangsi.* Bull. Geo Soc. China, 1941, vol. 21, pp. 53–58, 2 figs.

Alteration products of the chalcosine, occurring as pockets in a baryte-quart vein, are firstly earthy tenorite(?) followed by chessylite, malachite, and libethe nite. In the absence of any chalcopyrite or bornite, the chalcosine is probabl hypogene and primary. L. J. S.

LeMesurier (C. R.). *Carminite and bindheimite from the Ashburton distric* Journ. Roy. Soc. Western Australia, 1939, vol. 25 (for 1938–39), pp. 137–14

Carminite as brick-red scoriaceous masses, associated with scorodite, anglesit galena, &c., from Wyloo station, Hardey river, gave As_2O_5 33·22, P_2O_5 0·3 Fe_2O_3 23·07, FeO trace, PbO 38·14, SO_3 1·35, H_2O+ 3·71 = '99·80', agreein with $PbO.Fe_2O_3.As_2O_5.1\frac{1}{2}H_2O$ [M.A. 7–260]. Minute crystals are prismatic wit straight extinction; sp. gr. 5·22, H. 5. Bindheimite as yellow earthy materi filling cavities in granular cerussite, anglesite, and quartz from Mt. Amy (an George Creek) gave Sb_2O_5 16·13 (38·57), PbO 59·05 (32·12), Al_2O_3 4·48 (7·37 Fe_2O_3 2·32 (4·43), CuO 1·05 (nil), Na_2O 0·60 (n.d.), K_2O 0·26 (n.d.), SiO_2 1·3 (6·07), CO_2 7·06 (n.d.), SO_3 3·66 (n.d.), P_2O_5 trace (nil), H_2O+ 3·21 (3·98), H_2O- 0·42 (1·43) = 99·54 (93·97). The first analysis agrees with the orthoantimonat formula $2PbO.Sb_2O_5.H_2O$. Previously published analyses give different formula some representing metantimonates. L. J. S.

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